GIARDIASIS IN CHILDREN*

REPORT OF CASES

By S. J. McCLENDON, M. D.
San Diego

DISCUSSION *by Herbert Gunn, M. D., San Francisco; Francis Scott Smyth, M. D., San Francisco.*

OUR experience with twenty-two cases of giardiasis in children between two and fifteen years of age has convinced us of the pathogenicity of this organism, and an analysis of these cases has shown us that the giardia flagellate may be responsible for a great variety of symptoms not necessarily associated with the gastro-intestinal tract.

REPORT OF CASES IN LITERATURE

The giardia was first described by Lambl in 1854, but it was not until twenty-five years later that Grassi gave us our real information concerning this parasite. In 1892 the frequency of its infestation in children was noted by Moritz and Holzl [1] and in 1902 a case was reported in the United States (Baltimore) by Stiles.[2] Since that time occasional cases have been reported in the literature. In 1921 Maxcy [3] reported a series of eighteen cases and reviewed the work of British investigators who had found a high incidence of the disease in children. Other cases in this country have been reported especially by Noone, Waltz and Donnelly,[4] Peterman,[5] Stevenson,[6] and Zahorsky.[7]

SYMPTOMS

In our clinic, routine stool examinations are made on all children and treatment is instituted for the giardia infection whenever it is found. Such treatment has resulted in clearing up many symptoms, both subjective and objective, associated not only with the gastro-intestinal, but also with the genito-urinary and central nervous systems. Such symptoms as abdominal tenderness, pain, nausea, and constipation are common complaints, but there are in addition many symptoms of less definite and concrete nature, such as nervousness, irritability, and easy fatigue, which disappear rapidly with the clearing up of the intestinal infection.

The symptoms encountered in our series of cases in the order of their frequency were: abdominal tenderness, especially over the ascending and descending colon, in seventeen patients; constipation in eleven patients, nervousness in ten, easy fatigue in seven, gas and belching in seven, inability to gain weight in six, poor appetite in six, irritability in five, headaches in five, enuresis in four.

It is to be noted that whereas diarrhea is one of the most frequent symptoms associated with intestinal infections, it was encountered in our series of giardia infestation in but one instance; in marked contrast is the fact that constipation occurred in 50 per cent of the patients. Noone, Waltz, and Donnelly [4] also found constipation proportionally higher among those children who had giardia infections. Maxcy [3] found a tendency to increased defecation but no diarrhea. Several observers, however, notably Zahorsky,[7] Lynch,[8] and Miller,[9] have found diarrhea a constant finding in giardia infestations. Miller [9] considers the resultant diarrhea sufficient to retard growth and development; Lyon and Swalm [10] noted it during the acute stage of the disease and found it a more frequent finding in giardia infection in children than in adults where they found constipation to be the rule.

The subject of enuresis in children has always been a difficult problem and it is very interesting to note that in this series there were four patients with associated enuresis, all of which were entirely relieved with the clearing up of the giardia infection. In none of these four patients could any pathology be demonstrated in the genito-urinary tract.

REPORT OF CASES

Brief reports are given to illustrate: one, a common type of giardiasis; two, giardiasis in a case simulating duodenal ulcer; three, giardia as the etiological factor in (*a*) a patient with so-called mucous colitis, (*b*) a patient with diarrhea, and (*c*) a patient with enuresis.

CASE 1.—A common type of giardiasis. A girl, eight years of age, was brought in with the diagnosis, made by the mother, of chronic appendicitis; this diagnosis was based on the recurrent attacks of abdominal pain. The pain was not localized, however, and was present on both sides of the abdomen. Other complaints were constipation, gas and belching, poor appetite, inability to gain weight, nervousness, and restlessness. A roentgen examination of the gastro-intestinal tract had been made elsewhere, but failed to disclose any pathology. Physical examination was essentially negative except for the laboratory findings which revealed a mild secondary anemia and a marked giardia infestation of the intestinal tract. Following treatment for the giardia infection all intestinal symptoms have disappeared and the general condition of the child is showing improvement. The stools were negative for giardia after four months of treatment and have remained so to date.

* * *

CASE 2.—Giardia and a simulated duodenal ulcer. The patient, a girl thirteen years of age, complained of pain and soreness in the epigastrium, gas and belching, constipation, frontal headaches, dizziness, and easy fatigue. The epigastric pain came on two or three hours after meals and was fairly constant in character. The nature of this pain was similar to that experienced by the patient's father, who had a duodenal ulcer and made the family suspicious of an ulcer in this case; they therefore requested that a roentgen study be included in our examination. Physical examination disclosed slightly septic tonsils with enlarged anterior and posterior cervical glands; slight uniform enlargement of the thyroid gland; and definite tenderness over the mid-epigastrium and the descending colon; the colon was also palpable at the point of tenderness. Blood cytology showed a hemoglobin of 88 per cent (Newcomer), and 12,400 white corpuscles with a normal differential count. The Kahn reaction on the blood serum was negative. Urinalysis showed a specific gravity of 1.103, two plus albumin, and one to two pus cells per high

* From the Rees-Stealy Clinic, San Diego.

* Read before the General Medicine Section of the California Medical Association at the fifty-ninth annual session at Del Monte, April 28 to May 1, 1930.

power field. Stool examination revealed the presence of giardia cysts. The possibility of a slight hyperthyroidism which might be associated with the intestinal symptoms was ruled out by a basal metabolic rate of plus four. The roentgen examination of the gastro-intestinal tract showed a spastic duodenum but no definite ulcer; this spasm relaxed with atropin, as a subsequent x-ray plate taken three days later showed; neither spasm nor stasis was present on this examination. The only positive findings, therefore, were the slightly infected tonsils and the giardia infection which had probably localized in the duodenum and biliary tract, the common habitat of the parasite. Treatment for the giardiasis was accordingly instituted with the gradual clearing of all symptoms, including the albuminuria.

Case 3.—Giardia and mucous colitis. Giardia was found to be the unsuspected offender in one case of so-called "mucous colitis" in a boy ten years of age. Constipation, mucus in the stool, and enuresis were the chief complaints in this patient. Physical examination was negative except for some distention of the abdomen and tenderness over the descending colon; urinalysis was negative, and the blood count disclosed nothing abnormal. Examination of the stool revealed a heavy giardia infestation. Following three courses of treatment, the stools became negative and have remained so for nine months, the mucus disappeared and the other symptoms cleared up.

Case 4.—Giardia and enuresis. A girl, five years of age was brought to us complaining of nocturnal enuresis, increased urinary frequency during the day, and nervousness. These symptoms had been present for one and one-half years. Physical examination revealed slightly septic tonsils with no history of sore throats or frequent colds; enlarged anterior and posterior cervical glands and a palpable enlarged descending colon and sigmoid. Investigation of the genito-urinary tract disclosed no pathology. Blood count showed 4,728,000 red corpuscles; hemoglobin of 80 per cent (Newcomer); white corpuscles, 14,200; with a differential count of neutrophils, 51 per cent; lymphocytes, 4 per cent; large mononuclears, 4 per cent; and eosinophils, 16 per cent. Urinalysis was completely negative. Stool examination showed the presence of giardia. Tonsillectomy was advised but not performed. Complete relief of the enuresis and the disappearance of accompanying symptoms, however, followed the treatment for the giardia infection and the subsequent eradication of the flagellate.

Case 5.—Giardia and diarrhea. A boy, seven years of age, was brought in to us because of incontinence of the stool and urine accompanied by a chronic diarrhea which manifested itself by eight or ten stools a day. The child was nervous and restless in his sleep; his abdomen was slightly distended and rectal examination showed some spasm of the lower rectum and internal sphincter. Treatment for the existing giardia infection brought complete relief of symptoms.

Case 4 is the only patient in our series in whom an eosinophilia was found and we have no explanation for it. All other case reports in the series bear out observations of other reporters, that the giardia infestation, unlike other parasitic infestations, is not accompanied by an eosinophilia.

TRANSMISSION

It is now a generally accepted view that transmission of the infection takes place through contaminated food and contact with infected individuals, though animals may be the intermediary hosts. The giardia cysts are very resistant to heat, and it requires five minutes' exposure to 64 degrees Centigrade to kill them. If bacteria and putrefactive products are removed by careful washing, the cysts will live in distilled water at a low temperature for several months; in formed stools they have been found viable for several days.

EXAMINATION OF STOOLS

In examining stools for giardia, at least three specimens are examined in each case. The first should be a warm specimen, following a saline laxative; this is either passed at the office or brought in in a thermos container; the other two specimens should be formed stools. The duodenum is a more common habitat of the giardia than is the lower intestinal tract and it is probably for this reason that motile giardia are rarely found in the stools, but pass from the intestine in the encysted form. Of all the protozoan cysts they are the most easily identified and after a suspension in normal saline is examined under a cover slip, identification can almost always be made by the use of Donaldson's iodin-eosin stain or a modification thereof; rarely degenerated forms are found and Heidenbain's iron-hematoxylin stain must be used.

TREATMENT

Our treatment of giardiasis in children consists in the administration by mouth of bismuth salicylate and treparsol. Bismuth salicylate is given daily for ten days in doses of from five to ten grains; this is followed by a rest period of one week. Treparsol in doses of from two to four grains, twice daily, is then given for ten days. Following a second rest period of one week, a second course of the two drugs is given in the same manner. Three or four courses of medication are sometimes required before a negative stool is obtained, and the treatment should be continued until the parasite is eradicated. During treatment the patient is kept on a non-irritating, low residue diet.

Stool examinations are made at intervals of three months over a period of from one and one-half to two years following the first disappearance of the flagellate from the stool so that prompt treatment may be instituted in case of recurrence. No recurrence has been noted in our series.

We have used treparsol rather than stovarsol in our method of treatment because of its lessened toxicity and also because of the greater amount of arsenic available in treparsol. In no patient so treated did an arsenical dermatitis develop.

CONCLUSIONS

1. From a careful study of a series of twenty-two cases of giardiasis in children, we believe that the giardia is a definite factor in the etiology of many symptoms referable not only to the gastro-intestinal but also to the genito-urinary and central nervous systems. We believe that routine stool examinations should be made in all cases and treatment instituted for the giardia in-

fection whenever it is found. Our experience has demonstrated that such treatment may clear up many symptoms which have no apparent association with gastro-intestinal disease and in connection with which the presence of a giardia infection would not have been suspected.

We also wish to reiterate our observation that diarrhea is not a common symptom of giardia infection in children; it occurred only once in our series, whereas constipation was present in 50 per cent of the cases.

2. We have found the use of bismuth salicylate and treparsol with a nonirritating, low residue diet, a very effective form of treatment and by this means we have been able to clear up the giardia infection in every patient in our series.

2001 Fourth Street.

REFERENCES

1. Moritz and Holzl. München. med. Wchnschr., 39, 831, 1892 (cited by Maxcy).

2. Stiles, C. W. Wash. Med. Ann., 1, 64, 1902 (cited by Maxcy).

3. Maxcy, Kenneth F. Giardia (Lamblia) Intestinalis—A Common Protozoan Parasite of Children. Johns Hopkins Hosp. Bull., 32, 166-170, 1921.

4. Noone, Ernest L., Waltz, Arthur D., and Donnelly, John D. Giardia Intestinalis and Other Intestinal Parasites in Children. Atlantic M. J., 30, 292, 692, 1927.

5. Peterman, M. G. Pathogenic Giardiasis in Children. J. Lab. and Clin. Med., 13, 75-76, 1927.

6. Stevenson, C. W. Giardiasis—Report of Cases. Texas State J. Med. 23, 596-599, 1928.

7. Zahorsky, John. Giardiasis in an Infant, M. Clin. North America, 311-313, 1927. Giardiasis in Children, South. M. J., 21, 595-597, 1928. McLoon, M., Giardiasis in Children, J. A. M. A., 88, 385-7, 1927.

8. Lynch, K. M. Effects of Intestinal Protozoa. Proc. Internat. Assemb. Inter-State Post-Grad., M. A. North America (1928), 377-380, 1929.

9. Miller, R. Lambliasis as Cause of Chronic Enteritis in Children. Arch. Dis. Childhood, 1, 93-98, 1926.

10. Lyon, B. B., and Swalm, W. A. Giardiasis—Its Frequency, Recognition, Treatment, and Certain Clinical Factors. Am. J. M. Sc., 170, 348-364, 1925.

DISCUSSION

HERBERT GUNN, M. D. (2000 Van Ness Avenue, San Francisco).—Doctor McClendon in his article on "Giardiasis in Children" states in his opening remarks that his experience with the twenty-two cases described convinces him of the pathogenicity of the organism.

It would appear to me that such a conclusion is hardly justified as he has adduced no evidence to show that the symptoms complained of in this group of patients were in any way related to the giardia infection, unless one considers the improvement noted after treatment as such. Of course disappearance of symptoms with the disappearance of a parasite following a specific treatment is suggestive evidence that the parasite so removed is the cause of the trouble, but by no means absolute proof of it. *Amebae coli,* if present, might readily be removed by the treparsol used and yet it would probably have no connection with the symptoms present. Drugs like treparsol have many effects on the body tissue as well as on some of the protozoa. Furthermore, the effect of proper dieting and general hygienic measures must be considered in connection with the effect of the drugs used. The most interesting aspect to me of Doctor McClendon's article is the fact that I have long ago demonstrated quite thoroughly to my own satisfaction that the arsenicals have not the slightest effect on the eradication of giardia. For over fourteen years I have used neosalvarsan (the effects of which are practically identical with those of treparsol) in the treatment of amebic infections and it was noted that the drug had no effect on giardia when present. I have used stovarsol in a number of amebic cases where giardia was also present, with the same result. I have seen quite a number of patients who had been treated by others, some of them over long periods of time, for giardia infection, most of them having received arsenicals in addition to various other drugs and in none of these patients was the giardia absent. The more work that one does with the giardia the more one comes to realize how elusive this parasite may be. It not infrequently disappears temporarily from the stool; to be certain that it is absent one must go over a series of stools passed on consecutive days; and even such a test, if negative, may be proved erroneous on repeating the procedure. However, I believe that proper methods of examination of the stool, especially if a concentration method is used, such as that of Adams and Yorke, will demonstrate the presence of giardia no matter what drugs are used. These views, I may state, have been expressed by many competent observers in various parts of the world. A very interesting article by McGath and Brown of the Mayo Clinic, which covers the subject of the pathogenicity of giardia, was published in the March journal of the *American Journal of Tropical Medicine.* They discussed 267 cases of giardia infection with 420 control cases which did not have giardia present. I will quote a paragraph from this article:

"It is obvious from our study that no chain of symptoms can be ascribed to the presence of either chilomastix or giardia. Not only can the whole group of cases be matched by a control group in which the patients do not have parasitic infestation, but individual cases can be accurately duplicated; even the indefinite condition known as chronic nervous exhaustion was not more prevalent in persons infected with chilomastix and giardia than in the control group."

In my own experience with giardia I have yet to see a single patient where I could definitely connect symptoms with the parasite. I have a number of patients harboring giardia whom I have watched over considerable periods of time and in none of these have symptoms ever occurred which it was necessary to ascribe to this parasite.

*

FRANCIS SCOTT SMYTH, M. D. (University of California Hospital, San Francisco).—A rather limited experience in the field of parasitology makes one hesitate to discuss the paper of Doctor McClendon. About a dozen children in the University of California Hospital ward in the past few years have shown the presence of giardia on stool examination. However, there has been no uniformity with regard to symptoms or complaints, and in several instances the patients were admitted for obvious pathology quite remote from the gastro-intestinal tract, the presence of giardia being discovered by chance stool examination. In other cases the giardia were found associated with parasites of unquestioned pathogenicity such as *Entameba dysenteria.*

Experience of this type leads one to question the rôle of giardia. Previous reports in the literature do not settle the matter of pathogenicity and, as Doctor Gunn mentions, the fluctuations in the appearance and disappearance of the parasite make conclusions concerning therapy difficult. Certainly many observers have noticed little effect from arsenicals, the parasite varying regardless of therapy. It would facilitate

our knowledge as to the pathogenicity of the organism were the following known:

1. The incidence in the stool of normal children.

2. The variability in stools of normal children and those giving symptoms.

3. Comparison of effect of therapy (arsenic, antimony, etc.), in those patients with these varying symptoms with *and* without the parasite in the stools.

❋

Doctor McClendon (Closing).—This paper was presented as a report of our experience in a series of cases of twenty-two children in whom a giardia infestation was found. In these children there were no physical or laboratory findings to account for the symptoms presented other than the presence of giardia in the stools. It seems to us, therefore, rather more than a coincidence that these patients were not only benefited by the treatment, but were at the same time relieved of their giardia infestation, as subsequent stool examinations have shown. We appreciate the fact that enthusiasm may cause us to be strongly biased on the question of the pathogenicity of this organism. On one side of the question we have the opinion of Doctor Gunn, who has maintained for many years his belief in the nonpathogenicity of this organism, and on the other we have the attitude of equally keen observers who believe that the organism is pathogenic. Our experience with this series of twenty-two patients leads us to agree with this latter group and to regard giardia as one of the pathogenic types of protozoa.

CHYLOTHORAX*

REPORT OF CASE

By Roscoe G. Van Nuys, M. D.
Berkeley

Discussion *by Robert A. Glenn, M.D., Oakland; Robert S. Stone, M.D., San Francisco.*

UNUSUAL pathology and conditions of obscure etiology always hold our interest. It has happened to most of us that we have never been alert to certain pathological changes until some author has called the same to our attention.

REPORT OF CASE

Since the patient, Dr. H., is a physician, who was referred to us by Dr. W. H. Crane, his own story will be presented as he gave it.

Age, thirty-nine years. Birthplace, British West Indies.

Grandparents long-lived; cause of death unknown. Mother died in early thirties of heart disease; no knowledge of cancer, tuberculosis, or any specific disease in the family. Had measles in early childhood. Malaria first contracted in early childhood, with recovery. It recurred at twenty-one years of age while living in Panama. This impaired my health for a year or more and was accompanied by digestive disturbances at irregular intervals. Had varicocele on left side at age of fourteen, which seemed to have started soon after a blow while wrestling with another boy. This was operated upon several years later. Also had influenza. After the attack my ability for athletics was somewhat impaired. In the summer of 1922 while attending medical school I had afternoon fever for six weeks. The possibility of tuberculosis was considered, but physical examination and x-ray did not reveal enough to justify a diagnosis of that disease. Because of malarial history, quinin was given. The slight fever left suddenly after six weeks and school work was continued without difficulty, though not without effort. Negative to gonorrhea and syphilis. About nine months ago digestive disturbances were noticed. These grew steadily worse and failed to respond to ordinary dietetic measures. Marked gaseous distention added to this discomfort. One day a sudden sharp pain was felt in the region of the epigastrium which was akin to the pain patients describe when a hollow viscus is ruptured. After the initial intensity the pain subsided and the general condition felt improved for a while. After a month it was noticed that slight exertion, such as walking upstairs, made me quite tired, and running was out of the question. Finding that rest improved the condition, I took as much rest as possible. The development of a thrombotic hemorrhoid caused me to consult a physician, who found fluid in the pleural and peritoneal cavities. X-ray confirmed this. Several quarts of pleural fluid were aspirated on the first day, and two quarts the next morning. Withdrawal of the pleural fluid seemed to cause the abdominal fluid to disappear, and it again returned as the pleural fluid accumulated.

Laboratory report by Doctor Glenn (September 20, 1929): Pleural fluid examined for ameba, echinococcus and bacilli of tuberculosis. The specimen consists of very turbid, pinkish gray, limpid fluid. Fresh and stained smears show no pus cells nor bacteria, but many red blood cells settled to the bottom. A small portion of this was treated with ether and shaken. The fluid promptly cleared and became an amber solution. A drop of fluid on a slide was stained with Sudan three and clear, stained fat droplets appeared.

Other examinations: The Wassermann was negative; the urine was negative. Blood count: white blood cells, 7300; small lymphocytes, 31; large, 6; polymorphonuclears, 61; transitionals, 2; hemoglobin, 76.

Conclusion: True chylous effusion, due either to trauma or, more likely, to pressure on the thoracic duct by a tumor mass.

ETIOLOGY

Chyle is lymph derived from the walls of the alimentary tract. Chylothorax is a condition in which the pleural cavity contains chyle. This condition results from a rupture of the thoracic duct or its radicals, or from a pathological condition in their walls, whereby the contents may be transuded into the pleural cavity. Trauma in some form is the most frequent cause. This often occurs in the upper part of the duct near its junction with the subclavian vein. Accidents of surgery in the lower cervical region, gun-shot wounds, or self-inflicted wounds may bring about this condition. Watts describes the case of a demented man who ran a knife into his suprasternal notch. Trauma of the lower portions of the duct may be caused by fracture of the vertebrae and ribs. Hypertrophic spurs may, during an accident, injure the duct, especially when it has lost its elasticity by some pathology about it. Such a case was described by Lindenberg of Germany. The next of importance are newgrowths, carci-

---

* Read before the Radiology Section of the California Medical Association at the fifty-ninth annual session at Del Monte, April 28 to May 1, 1930.